BTEC Assignment Brief

Qualification	Pearson BTEC International Level 3 Subsidiary Diploma in Applied Science Pearson BTEC International Level 3 Foundation Diploma in Applied Science Pearson BTEC International Level 3 Diploma in Applied Science Pearson BTEC International Level 3 Extended Diploma in Applied Science Pearson BTEC International Level 3 Extended Diploma in Biomedical Science
Unit number and title	**Unit 21: Applications of Organic Chemistry**
Learning aim(s)	**C:** Investigate organic chemistry reactions in order to gain skills in organic synthesis
Assignment title	**Organic synthesis**
Assessor	
Issue date	
Hand in deadline	

Vocational Scenario or Context	You are a laboratory technician working in an analytical laboratory and in this role you learnt how to work with organic compounds in laboratories, in pilot scale and on the chemical plant using safe working practices. You have a good knowledge, and competent practical skills. Many organic compounds are inflammable and are hazardous to health. Organic compounds are used in many research and pilot scale laboratories to produce and analyse new compounds. Because of this your department regularly receives visits from schools, and your supervisor has allocated you the task of testing out an assessment that will be used by the 'BTEC students' undertaking work experience in your laboratory.

Task	You will need to **carry out** practical synthesis and testing and provide portfolio of results/notes, **evaluate** factors which will affect synthesis and explain why these factors affect yield and purity and **explain** at least two functional group reactions carried out in your practical synthesis. Your final portfolio will comprise of the following 3 sections: Section 1 - Synthesis and testing of organic compounds • **Carry out** practical synthesis of at least one organic liquid and one organic solid: o Organic solid - Synthesise at least one of the following organic solids using the techniques of vacuum filtration, filtration through

filter paper, and recrystallisation:

- preparation of aspirin or paracetamol
- nitration of methyl benzoate, phenol, methylbenzene or methoxybenzene
- preparation of an azo-dye

o Organic liquid - Synthesise at least one of the following organic liquids using the techniques of reflux and distillation, and add chemicals to purify the liquid you have made

- preparation of ethyl ethanoate, ethyl benzoate or 3-methylbut-1-yl ethanoate (banana oil)
- oxidation of alcohols (e.g. ethanol, cyclohexanol) to aldehydes, ketones or
- carboxylic acids
  preparation of a halogenoalkane (e.g. 2-chloro-2-methylpropane) from an alcohol

A witness testimony or photographic evidence of safe working practices of at least two of the practical exercises if required. Follow given techniques and procedures competently and correctly. Carry out qualitative tests of functional groups present. Measure the boiling point of the liquid product(s), and where possible an infra-red spectrum. For organic solid product(s) carry out a melting point, a mixed melting point or thin layer chromatography on the product. Draw simple conclusions about the purity of the product.

Section 2 - An explanation of underpinning reactions

- **Explain** fully at least two of the reactions carried out (organic solid and organic liquid). Include the functional groups of reactants and products, reaction conditions, equations, mechanisms, temperature and timing.

Section 3 – Factors affecting the synthesis reactions

Evaluate factors affecting the reactions, giving detailed explanations of why these factors would affect the yield and purity. Consider the strengths and weaknesses of reaction conditions and reagents chosen. Comment on reliability of techniques and methods used, providing percentage errors for measurements and reliability of the tests of the product's identity and purity to underpin your judgements. Propose improvements in reaction conditions, reagents, time, equipment and or techniques used. Comment on the relevance of scaling up to an industrial scale for example efficiency, percentage yield.

Checklist of evidence required	A portfolio of reactions that includes observations of safe working practices and risk assessment: • Practical synthesis of organic compounds and quantitative testing of the products • Explain two chemical reactions carried out of appropriate functional groups • An evaluation of the factors affecting the chemical reactions.

Criteria covered by this task:	
Unit/Criteria reference	To achieve the criteria, you must show that you are able to:
C.D3	Evaluate the practical work carried out in terms of product yield and purity, and factors affecting this.
C.M5	Explain the chemical reactions carried out in terms of the functional groups, reagents, mechanism and reaction conditions involved.
C.P7	Carry out practical synthesis of organic compounds safely and qualitatively test products.
Sources of information to support you with this Assignment	All sources of information suggested are UK based. Centres are free to amend these sources to those available in the Country of delivery where more appropriate. www.edu.rsc.org - organic synthesis starters, designing organic synthesis, carbonyl chemistry starters, organic chemistry: a practical opportunity www.wiley.com –practical organic synthesis – a student's guide www.tes.com – organic synthetic pathways Within the copyright laws learners could search YouTube for: –organic techniques, basic principles and techniques, organic mechanisms.
Notes to the Assessor and technician	The practical activities suggested for this assignment are required to be safety checked by the Centre before use. Pearson Education can take no responsibility for the safety of any practical activities. Before doing any practical activity, you should always carry out your own risk assessment and refer to the necessary regulations. In particular, any local rules issued by your employer must be obeyed, regardless of what is suggested here. Centre should use Health and Safety information provided by a reputable

	source. In the UK such an example organization is CLEAPSS http://science.cleapss.org.uk/